Risky Alcohol Use, Age at Onset of Drinking, and Adverse Childhood Experiences in Young Men Entering the US Marine Corps

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ARTICLE

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Objective: To examine how childhood experiences relate to risky underage drinking.

Design: A survey study of men starting military training between June 11, 2002, and April 5, 2006. Multivariate logistic regression models compared risky drinkers with "all others" or with nonrisky drinkers; excluding nondrinkers.

Setting: Marine Corps Recruit Depot, San Diego, Calif.

Participants: Forty-one thousand four hundred eighty-two men aged 18 to 20 years.

Main Exposures: Age at drinking onset; childhood emotional, physical, and sexual abuse; childhood emotional and physical neglect; and household alcohol abuse, mental illness, domestic violence, or divorce.

Main Outcome Measures: Risky drinking identified by scoring responses to 3 questions about alcohol consumption.

Results: Of 41 482 young men, 6128 (14.8%) were identified as risky drinkers, 18 693 (45.1%) as nonrisky drinkers, and 16 661 (40.2%) as nondrinkers. Among drinkers, early initiation of alcohol use was strongly associated with risky drinking, with a 5.5-fold risk if age at onset of drinking was 13 years or younger. Other associated factors included tobacco use, rural or small hometown, higher education, motivation to join the military for travel or adventure or to leave problems at home, numerous close friends and relatives, household alcohol abuse or mental illness, and childhood sexual or emotional abuse. When the comparison group included nondrinkers, additional associated factors included childhood physical abuse and domestic violence.

Conclusions: These analyses confirm previous findings on risks for alcohol misuse in young adults and quantify these risks in new, large, multivariable models, adding unique perspective from a population of young Marines. Public health efforts to decrease alcohol misuse may be effectively targeted by prevention of underage alcohol use, tobacco use, and childhood abuse.

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In 2004, half of persons living in the United States aged 12 years or older (121 million persons) reported current alcohol use, with prevalence ranging from 2.3% in 12-year-old children to 69.8% in persons aged 21 years.[1] Approximately 4.4 million persons in the United States used alcohol for the first time in 2004, and most new users (86.9%) were younger than 21 years at first use of alcohol.[1] Heavy alcohol use among male Marines aged 18 to 25 years occurs at twice the civilian rate for the same age group (38.6% vs 17.8%, respectively).[2]

Many studies have shown a relationship between adverse childhood experiences, and alcohol misuse and abuse as an adult,[3-8] with the largest study including 13 494 participants.[5] Additional studies have found that early first use of alcohol increases the risk of developing alcohol disorders and alcohol-related injuries.[9-14] To our knowledge, no studies have examined both adverse childhood experiences and age at first use of alcohol in relation to alcohol misuse.

The Recruit Assessment Program (RAP) study was begun at the Marine Corps Recruit Depot, San Diego, Calif (MCRD San Diego), on June 12, 2001, to collect computerized comprehensive baseline health data from new military personnel.[15,16] The RAP questionnaire is administered to recruits in the first days of 12-week recruit training. Most recruits (>80%) have not reached legal drinking age when they begin their Marine training; thus, our objective was to examine the relationship between factors including adverse childhood

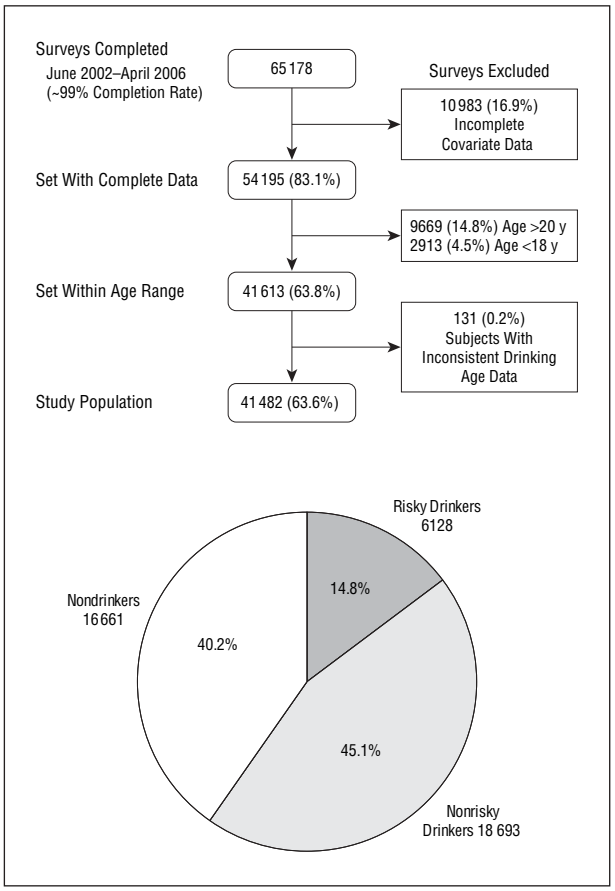

Figure. Schematic diagram illustrating exclusions for analysis of risky drinking in male recruits at onset of training at the Marine Corps Recruit Depot, San Diego, Calif.

experiences and age at onset of drinking with risky drinking in an underage military population, using self-reported RAP data.

METHODS

STUDY POPULATION AND DESIGN

The RAP study was approved by institutional review boards of the Naval Health Research Center and the Naval Medical Center, San Diego. The MCRD San Diego trains between 17 000 and 18 000 recruits per year. Because only men are trained in San Diego, our evaluation excluded women. All recruits were invited to complete an RAP questionnaire; participation rates were approximately 99% during the study period. Recruits were told that their answers would not disqualify them for military service, and informed consent was obtained before recruits completed the questionnaire. Between June 11, 2002, and April 5, 2006, 65 178 surveys were collected from male Marine recruits at MCRD San Diego. Selected self-reported characteristics were evaluated to include demographic data (age, race, hometown, marital status, educational achievement, and reasons for joining the military), family background (parental educational achievement and number of close relatives and friends for support), general history (frequency of attendance at a religious gathering and tobacco use), and childhood experiences (whether grew up with 2 parents, a mentally ill or depressed person, or a problem drinker or alcoholic; parental divorce; domestic violence; physical or emotional neglect; and emotional, physical, or sexual abuse). In addition to sexual abuse, a related question regarding history of rape was included.

Of 65 178 surveys, 54 195 (83.1%) contained complete outcome and covariate data for this analysis. Because our focus was underage drinking behavior among those aged 18 to 20 years, we excluded 9669 recruits (14.8%) aged 21 years or older and 2913 recruits (4.5%) younger than 18 years. In addition, we excluded 117 inconsistent recruits (0.2%) who gave a positive response about alcohol use but a contradictory response ("I have never had a drink") when asked at what age they first used alcohol, and 14 recruits (0.02%) who were aged 18 to 20 years but responded that they first used alcohol at age 21 years or older. For the remaining 41 482 respondents (63.6%), self-reported exposures in this survey study were examined (**Figure**).

MEASURES

The RAP questionnaire was developed by public health officials, clinicians, and researchers from the Department of Defense, Department of Veterans Affairs, and Department of Health and Human Services. Questions were derived from standardized survey instruments, including the Alcohol Use Disorders Identification Test (AUDIT),[17-22] National Comorbidity Study,[23,24] Adverse Childhood Experiences Study,[5,6,25-27] Childhood Trauma Questionnaire,[28,29] and Conflict Tactics Scales.[30] The Adverse Childhood Experiences Study questions were first added to the RAP survey instrument in June 2002.

Because of time limitation, not all items of the 10-item AUDIT are asked on the RAP questionnaire. Focus group testing of the questionnaire in small groups of recruits led to inclusion of 3 questions derived from the AUDIT–Alcohol Consumption Questions (AUDIT-C)[18-22] questionnaire, with possible scores ranging from 0 to 12 points (**Table 1**).

Our primary outcome, risky drinking, was defined using the 3 questions derived from AUDIT-C. To meet the outcome definition, a score of 4 points or more, of the maximum of 12 points, was required. A score of 4 points has been shown to be an optimal cutoff in screening for risky drinking.[18,21,22] It is possible that men could drink 1 or 2 drinks daily and score 4 points, but since the men in our analyses were all younger than the legal drinking age, we considered 4 points to be a fair cutoff to screen for risky drinking. Nonrisky drinkers were recruits who scored 1 to 3 points of the maximum of 12 points. Nondrinkers consistently marked negative responses to the 3 questions (Table 1), although they may have responded positively to another question about age at onset of drinking, as may be expected for many nondrinkers who experimented with tasting alcohol. The "all other" group comprised both nonrisky drinkers and nondrinkers.

Our exposures of interest included age at onset of drinking. This was initially defined as, "How old were you when you first had a drink containing alcohol?" In July 2005, this question was revised as, "Not counting sips, how old were you when you first had a drink containing alcohol?" With either question, the response options were, "I have never had a drink of alcohol," "13 years or younger," "14 to 15 years old," 16 to 17 years old," "18 to 20 years old," and "21 years or older."

To assess adverse childhood experiences, we used questions from the Adverse Childhood Experiences Study,[5,6,25-27] the Childhood Trauma Questionnaire,[28,29] and the Conflict Tactics Scales,[30] prefacing them with, "The following are statements about you when you were growing up, before you were 17 years old. Please choose the one answer that comes closest to the way you felt."

Physical neglect was defined by the responses "never true," "rarely true," or "sometimes true" to the statement, "There was someone to take care of you and protect you." Emotional neglect was defined by the responses, "never true," "rarely true," or "sometimes true" to the statement "You felt loved."

Table 1. Risky Drinking Scoring for the Recruit Assessment Program Survey Derived From the AUDIT-C

Question	Score 0	1	2	3	4
During the year (12 mo) before entering the military, how often did you have a drink containing alcohol?*	Never	Once or twice, a few times, or monthly	Weekly		Daily
During the past year, how many drinks containing alcohol did you have on a typical day of drinking?	None, 1, or 2	3 or 4	5 or 6	7-9	≥10
During the past year, how often did you have ≥6 drinks at one sitting?	Never	Once or twice, or a few times	Monthly	Weekly	Daily

Abbreviation: AUDIT-C, Alcohol Use Disorders Identification Test–Alcohol Consumption Questions.
*One drink equals 1 bottle or can of beer, 1 glass of wine, 1 wine cooler, or 1 shot of hard liquor.

To assess emotional abuse, we asked, "How often did a parent or adult living in your home swear at you, insult you, or put you down?" Emotional abuse was defined as present if the response was "often" or "very often."

Domestic violence was assessed with the question "How often did a parent or other adult living in your home push, grab, shove, slap, or throw something at each other?" Domestic violence was defined as present if the response was "sometimes," "often," or "very often."

To assess childhood physical abuse, we asked, "How often did a parent or other adult living in your home push, grab, shove, slap, or throw something at you?" Childhood physical abuse was defined as present if the response was "often" or "very often."

Childhood sexual abuse was assessed with the question, "How often did an adult ever touch you sexually or try to make you touch them sexually?" Childhood sexual abuse was defined as present if the response was "once or twice," "sometimes," "often," or "very often."

Tobacco use was assessed by asking the following 4 questions: "Have you smoked more than 100 cigarettes (5 packs) in your entire life?" "How many years did you smoke more than 3 cigarettes on most days?" "When you were smoking regularly, how many packs did you smoke each day?" "When did you last smoke a cigarette?" The never smoked group included those who consistently answered, "I have never smoked" to these questions; past smokers were those who had positive responses to the first 3 questions and last smoked a cigarette more than 1 year ago; current smokers, less than 2 pack-years, were those with a positive response to the first question and a history of smoking less than 2 pack-years for the second and third questions, and last smoked a cigarette within the past year; and current smokers, 2 or more pack-years, were similar to current light smokers except they had a history of smoking at least 2 pack-years.

DATA ANALYSIS

Descriptive investigations of population characteristics were completed. Univariate analyses, including χ^2 and measures of association, were performed to assess the significance of associations between exposures of interest and risky drinking. An exploratory model analysis was performed to assess regression diagnostics, significant associations, and possible confounding while simultaneously adjusting for all other variables in the model. These analyses yielded a consistent set of influential covariates, with $P \leq .15$, that were then included in subsequent model analyses. Multivariate logistic regression analysis using SAS software (version 9.1; SAS Institute Inc, Cary, NC) was used to determine the odds of an outcome of risky drinking using 2 comparisons: with "all other" recruits to include nonrisky drinkers and nondrinkers, and with nonrisky drinkers excluding nondrinkers. Odds ratios and 95% confidence intervals were calculated for Marine recruits with complete covariate data.

RESULTS

Of 41 482 recruits in our analysis, 6128 (14.8%) were identified as risky drinkers, 18 693 (45.1%) as nonrisky drinkers, and 16 661 (40.2%) as nondrinkers. **Table 2** summarizes frequency and percentage distribution of risky drinking scores by exposures of interest. Univariate analyses suggested significant associations between higher risky drinking scores and many covariates, particularly early age when having a first alcohol drink, tobacco use, and adverse childhood events.

To simultaneously control for many covariates, we used all covariates from Table 2 in multivariable logistic regression analyses for 6128 risky drinkers and 35 354 other recruits (**Table 3**). Risky drinkers were more likely to be smokers, from a rural or small hometown background, to have grown up with someone who was a problem drinker or alcoholic or who was depressed or mentally ill, and to have experienced childhood sexual or emotional abuse. They were more likely to report educational achievement beyond high school, having more close family members or friends available for personal support, and motivation to join the military for travel or adventure or to leave problems at home. Risky drinkers were slightly more likely to report childhood physical abuse and a history of witnessing domestic violence and to be 19 or 20 years of age at survey completion, rather than 18 years of age.

Factors inversely associated with risky drinking were being married, attending religious services weekly or more often, neither parent having completed high school, not knowing parental educational achievement, and motivation to join the military "to serve my country," for education and new job skills, or for a 20-year military career. A history of emotional neglect was also inversely associated.

Further analyses compared the 6128 risky drinkers and 18 693 nonrisky drinkers, excluding nondrinkers, from the comparison group (Table 3). Compared with those recruits who first used alcohol at age 18 to 20 years, drinkers who started younger were more likely to be identified as risky drinkers; those who started drinking at age 13 years were 5.5-fold more likely to be identified as risky

Table 2. Selected Characteristics of Male Marine Recruits at Onset of Training in San Diego, Calif*

Characteristic	Nondrinkers (Score, 0) (n = 16 661)	Nonrisky Drinkers (Score, 1-3) (n = 18 693)	Risky Drinkers (Score, 4-12) (n = 6128)
Age at first alcohol use, y			
Never	11 507 (69.1)	0	0
18-20	778 (4.7)	4749 (25.4)	541 (8.8)
16-17	2399 (14.4)	8642 (46.2)	2304 (37.6)
14-15	1149 (6.9)	3425 (18.3)	1978 (32.3)
≤13	828 (5.0)	1877 (10.0)	1305 (21.3)
Age at survey completion, y			
18	10 095 (60.6)	9998 (53.5)	2976 (48.6)
19	4762 (28.6)	5794 (31.0)	2032 (33.2)
20	1804 (10.8)	2901 (15.5)	1120 (18.3)
Race/ethnic group			
White	10 397 (62.4)	12 475 (66.7)	4539 (74.1)
African American	742 (4.5)	555 (3.0)	77 (1.3)
Hispanic	3770 (22.6)	3954 (21.2)	1054 (17.2)
Other	1752 (10.5)	1709 (9.1)	458 (7.5)
Hometown			
City with >100 000 persons	4997 (30.0)	5492 (29.4)	1468 (24.0)
Town or city with <100 000 persons	8308 (49.9)	9442 (50.5)	3220 (52.6)
Rural (eg, farm or ranch)	1611 (9.7)	2049 (11.0)	948 (15.5)
Moved a lot to different cities	1415 (8.5)	1446 (7.7)	422 (6.9)
Not sure	330 (2.0)	264 (1.4)	70 (1.1)
Marital status			
Married	258 (1.6)	319 (1.7)	81 (1.3)
Single, separated, divorced, or widowed	16 403 (98.5)	18 374 (98.3)	6047 (98.7)
Highest educational achievement			
Some high school but did not graduate	143 (0.9)	140 (0.8)	55 (0.9)
High school graduate or GED	14 129 (84.8)	15 129 (80.9)	4762 (77.7)
Some college or trade school, or higher	2389 (14.3)	3424 (18.3)	1311 (21.4)
Reason for joining the military†			
Education and new job skills	9445 (56.7)	10 873 (58.2)	3410 (55.7)
Travel or adventure	6106 (36.7)	7399 (39.6)	2650 (43.2)
Job to earn money	4448 (26.7)	5105 (27.3)	1746 (28.5)
Leave problems at home	764 (4.6)	959 (5.1)	459 (7.5)
Family member was in the military	1829 (11.0)	2206 (11.8)	767 (12.5)
20-Year career in the military	2544 (15.3)	2726 (14.6)	864 (14.1)
"To serve my country"	10 264 (61.6)	11 686 (62.5)	3805 (62.1)
Other reason	4838 (29.0)	5543 (29.7)	1835 (29.9)
Highest level of parental education			
Neither parent completed high school	1640 (9.8)	1688 (9.0)	424 (6.9)
At least 1 parent was a high school graduate or had a GED	9078 (54.5)	10 557 (56.5)	3595 (58.7)
At least 1 parent was a college graduate	4704 (28.2)	5287 (28.3)	1846 (30.1)
Unknown	1239 (7.4)	1161 (6.2)	263 (4.3)
No. of close friends or relatives for support			
None	1661 (10.0)	1036 (5.5)	308 (5.0)
1 or 2	4553 (27.3)	4848 (25.9)	1405 (22.9)
≥3	10 447 (62.7)	12 809 (68.5)	4415 (72.1)
Attendance at religious gathering (eg, church)			
Weekly or more often	6514 (39.1)	5893 (31.5)	1521 (24.8)
Less than weekly	10 147 (60.9)	12 800 (68.5)	4607 (75.2)
Tobacco use‡			
Never smoked	14 529 (87.2)	12 931 (69.2)	2909 (47.5)
Past smoker	232 (1.4)	420 (2.3)	156 (2.6)
Current smoker, <2 pack-years	1492 (9.0)	4112 (22.0)	2035 (33.2)
Current smoker, ≥2 pack-years	408 (2.5)	1230 (6.6)	1028 (16.8)
Raised by 2 parents			
No	4714 (28.3)	5314 (28.4)	1662 (27.1)
Yes	11 947 (71.7)	13 379 (71.6)	4466 (72.9)
Parents divorced			
No	10 574 (63.5)	11 183 (59.8)	3543 (57.8)
Yes, when respondent <10 y	4280 (25.7)	5336 (28.6)	1814 (29.6)
Yes, when respondent >10 y	1807 (10.9)	2174 (11.6)	771 (12.6)
Physically neglected as a child	2901 (17.4)	3050 (16.3)	1080 (17.6)
Emotionally neglected as a child	2665 (16.0)	2767 (14.8)	970 (15.8)
Emotionally abused as a child	1942 (11.7)	2289 (12.3)	951 (15.5)
Physically abused as a child	360 (2.2)	489 (2.6)	214 (3.5)
Sexually abused as a child	254 (1.5)	286 (1.5)	137 (2.2)
Witnessed domestic violence as a child	1081 (6.5)	1480 (7.9)	595 (9.7)
Grew up with mentally ill or depressed person	863 (5.2)	1161 (6.2)	550 (9.0)
Grew up with problem drinker or alcoholic	1459 (8.8)	2021 (10.8)	902 (14.7)
Ever raped	37 (0.2)	80 (0.4)	38 (0.6)

Abbreviation: GED, general equivalency diploma.
*Data are given as number (percentage), unless otherwise indicated.
†More than 1 reason could be selected.
‡For assessment of tobacco use, see the "Measures" subsection of the "Methods" section.

Table 3. Final Multivariate Regression Models for 6128 Risky Drinkers vs "All Others" (35 354)* and Nonrisky Drinkers (18 693)†

Characteristic	Risky Drinkers vs All Others‡	Risky Drinkers vs Nonrisky Drinkers‡
Age at first alcohol use, y		
18-20	NA	1.0
16-17	NA	2.3 (2.1-2.6)
14-15	NA	4.7 (4.2-5.2)
≤13	NA	5.5 (4.9-6.2)
Age at survey completion, y		
18	1.0	1.0
19	1.1 (1.0-1.2)	1.2 (1.1-1.3)
20	1.2 (1.1-1.3)	1.4 (1.3-1.5)
Race/ethnic group		
White	1.0	1.0
African American	0.5 (0.4-0.6)	0.5 (0.4-0.7)
Hispanic	1.1 (1.0-1.2)	1.1 (1.0-1.2)
Other	0.8 (0.7-0.9)	0.9 (0.8-1.0)
Hometown		
City with >100 000 persons	1.0	1.0
Town or city with <100 000 persons	1.3 (1.2-1.3)	1.2 (1.1-1.3)
Rural (eg, farm or ranch)	1.7 (1.5-1.9)	1.5 (1.4-1.7)
Moved a lot to different cities	0.9 (0.8-1.0)	0.9 (0.8-1.1)
Not sure	1.0 (0.8-1.3)	1.1 (0.8-1.4)
Marital status		
Single, separated, divorced, or widowed	1.0	1.0
Married	0.7 (0.5-0.9)	0.7 (0.5-0.8)
Highest educational achievement		
High school graduate or GED	1.0	1.0
Some high school but did not graduate	1.0 (0.7-1.3)	1.0 (0.7-1.4)
Some college or trade school, or higher	1.3 (1.2-1.5)	1.2 (1.1-1.3)
Reason for joining the military		
Education and new job skills§	0.9 (0.8-0.9)	0.9 (0.8-1.0)
Travel or adventure§	1.3 (1.2-1.3)	1.2 (1.1-1.3)
Leave problems at home§	1.3 (1.2-1.5)	1.3 (1.1-1.4)
20-Year career in the military§	0.9 (0.8-1.0)	0.9 (0.8-1.0)
"To serve my country"§	0.9 (0.8-1.0)	0.9 (0.9-1.0)
Other reason§	1.0 (0.9-1.0)	0.9 (0.9-1.0)
Highest level of parental education		
At least 1 parent was a high school graduate or had a GED	1.0	1.0
Neither parent completed high school	0.8 (0.7-0.9)	0.8 (0.7-0.9)
At least 1 parent was a college graduate	1.0 (0.9-1.1)	1.0 (1.0-1.1)
Unknown	0.7 (0.6-0.8)	0.7 (0.6-0.9)
No. of close friends or relatives for support		
None	1.0	1.0
1-2	1.3 (1.1-1.4)	1.0 (0.9-1.2)
≥3	1.6 (1.4-1.9)	1.2 (1.0-1.4)
Attendance at religious gathering (eg, church)		
Less than weekly	1.0	1.0
Weekly or more often	0.7 (0.6-0.7)	0.8 (0.7-0.8)
Tobacco use‖		
Never smoked	1.0	1.0
Past smoker	2.1 (1.8-2.5)	1.3 (1.1-1.6)
Current smoker, <2 pack-years	3.2 (3.0-3.4)	2.0 (1.8-2.1)
Current smoker, ≥2 pack-years	5.3 (4.8-5.8)	2.7 (2.5-3.0)
Raised by 2 parents§	1.1 (1.0-1.2)	1.1 (1.0-1.2)
Emotionally neglected as a child§	0.9 (0.9-1.0)	0.9 (0.8-1.0)
Emotionally abused as a child§	1.2 (1.1-1.3)	1.1 (1.0-1.2)
Physically abused as a child§	1.1 (1.0-1.4)	
Sexually abused as a child§	1.3 (1.0-1.6)	1.3 (1.1-1.7)
Witnessed domestic violence as a child§	1.1 (1.0-1.2)	
Grew up with mentally ill or depressed person§	1.3 (1.2-1.4)	1.2 (1.1-1.3)
Grew up with problem drinker or alcoholic§	1.3 (1.2-1.5)	1.2 (1.1-1.3)

Abbreviations: GED, general equivalency diploma; NA, not applicable.
*Nondrinkers and nonrisky drinkers are combined in the "all others" classification.
†Nonrisky drinkers excludes nondrinkers.
‡Data are given as adjusted odds ratio (95% confidence interval). Risk estimates are adjusted for all other factors in the table.
§Dichotomous variable.
‖For assessment of tobacco use, see the "Measures" subsection of the "Methods" section.

drinkers. Age at first use of alcohol was excluded from the previous analysis with "all other" recruits because this question did not apply to nondrinkers in this group.

In addition to age at first alcohol use, factors associated with risky drinking were the same as in the previous analysis, in which nondrinkers were included in the comparison group, except that the covariates for having experienced childhood physical abuse and for reporting household domestic violence were not found to be significant in the final multivariate logistic regression model. Factors inversely associated with risky drinking were identical to those in the previous analysis with the "all others" comparison group.

COMMENT

Several points are highlighted in this large survey study examining age at onset of drinking and adverse childhood experiences in relation to alcohol use in 18- to 20-year-old male Marine recruits. Our risky drinking scores were based on the AUDIT-C instrument, in which scores of 4 points or more have been demonstrated to have sensitivity ranging from 83.7% to 92.6% and specificity ranging from 69.0% to 92.0% in identifying patients with heavy drinking or active alcohol abuse or dependence.[18,22] This led to the identification of 14.8% of 18- to 20-year-old recruits as risky drinkers, consistent with previous large community surveys using detailed interviews where prevalence of alcohol abuse and dependence in the previous year among men who were 18 to 29 years old was 14% to 26%.[1,24,31]

While previous studies tend to look separately at associations between adverse childhood experiences with alcohol abuse and tobacco abuse,[3-6,25,26] our study was large enough that we were able to evaluate risky drinking, simultaneously controlling for tobacco use and adverse childhood experiences, in addition to other covariates, including age at onset of drinking. Early age at first alcohol use, adverse childhood experiences, and tobacco use are each independently associated with risky drinking behavior.

Among drinkers, the strongest correlate of a high risky drinking score was early age at first alcohol use, with a 5.5-fold risk if age at onset of drinking was 13 years or younger. This is consistent with previous studies that found that early alcohol use increases risk of developing alcohol disorders and experiencing alcohol-related injuries.[9-14] However, to our knowledge, this is the first time that the relationship between age at onset of drinking and risky drinking has been quantified in multivariable models of a large Marine Corps cohort.

Our findings underscore the need for programs and policies to reduce underage drinking, such as the minimum legal drinking age of 21 years. The American Medical Association recommends the following actions to address underage drinking[32]:

- Expand physician involvement by educating physicians about alcohol screening and intervention, especially for adolescents.
- Examine alcohol advertising and marketing practices and develop mandatory standards to prevent the targeting of young people.
- Increase alcohol excise taxes.
- Develop and fund counteradvertising and public awareness campaigns.
- Expand research on the harmful effects of alcohol on adolescents.
- Improve product labeling to warn people of the dangers and negative health effects of alcohol.
- Implement comprehensive school health programs to provide our children with decision-making skills and age-appropriate information to counter the impact of alcohol advertisements.
- Step up enforcement of existing regulations and underage drinking laws.

Our study results also reinforce the need for public health efforts to prevent tobacco use and child abuse. After early age at first alcohol use, the factor most strongly associated with risky drinking was tobacco use. Whether reducing smoking will reduce risky drinking among youth is an important but unexplored question.

The magnitude of the associations between individual adverse childhood experiences and risky drinking was smaller but still significant in our large sample. Langeland and Hartgers[4] concluded in their review of child abuse and alcoholism that there is insufficient evidence on which to base conclusions about relationships between childhood sexual abuse or childhood physical abuse and alcoholism in male subjects. The largest study in their review included 802 participants, which may not have been a large enough sample to show these relationships. Our data showed an increased association between childhood sexual, physical, and emotional abuse and risky drinkers when compared with all other recruits and an increased risk of childhood sexual and emotional abuse when compared with other drinkers. Our findings that growing up with a problem drinker or with someone who is mentally ill and that childhood emotional or sexual abuse were all independently associated with risky drinking are consistent with previous studies that concluded that adverse childhood events may contribute to negative consequences in adulthood, including adult alcohol abuse.[3-8,25-27]

Finding that being married is inversely associated with risky drinking is supported by studies noting that married men show lower levels of alcohol consumption.[33-35] Finding that weekly attendance at religious gatherings is inversely associated with risky drinking is also supported by literature noting that existential well-being is inversely associated with alcohol abuse or dependence.[36,37]

In many studies, older and better-educated subjects generally report healthier behaviors, but in this study focusing on 18- to 20-year-old male recruits, higher education increased risk of risky drinking behavior. A plausible explanation may be that 20-year-old recruits with some college education have drinking experience related to college, compared with younger men who enlisted right after high school. Binge drinking and heavy alcohol use rates are known to be significantly higher in full-time college students compared with other persons aged 18 to 22 years.[1]

It was unexpected to find that risky drinkers were more likely to report having many close friends or relatives for support, but this may indicate that young men are more

likely to indulge in risky drinking behavior for reasons of conviviality and peer group pressure.[38,39] It was also unexpected to find that a history of emotional neglect was inversely associated with risky drinking and that risky drinkers were slightly more likely to report being raised by 2 parents. While it is possible that multiple statistical comparisons may have resulted in spurious results, another explanation may be that risky underage drinking is such an enormous problem in the United States that not only youth from families with household dysfunction are susceptible to alcohol misuse but that this is a problem that also affects youth from intact and loving homes. Thus, it is plausible that many young men identified in our study as risky drinkers were raised in 2-parent families and felt loved and supported while growing up. Further research is needed to confirm these unexpected findings.

Finally, a novel finding of these analyses was the association between motivation to join the military and risky drinking. Those who joined to escape problems at home or for travel and adventure were more likely to report risky drinking behavior. Motivation to join for travel and adventure is perhaps not surprising if considered a surrogate for risk-taking behavior. In contrast, those who joined to have a 20-year career in the military or "to serve my country" were slightly less likely to report risky drinking behavior.

Our study was restricted to male Marine recruits who had passed initial screening for military entrance, and the findings can only be generalized to other similar populations. Our study was limited to self-reported data, which may have led to underreporting of adverse childhood experiences, risky drinking behavior, early age at first alcohol use, and misclassification of identified risky drinkers, nonrisky drinkers, and nondrinkers. Based on κ statistics to measure reproducibility,[40] recruits are generally candid in filling out these questionnaires. However, the sensitive nature of the questions evaluated in this study may have resulted in underreporting and, thus, underestimation of both predictor and outcome variables. Nevertheless, with our large sample size, we were able to simultaneously control for many potential confounders and detect many significant associations.

Similar to other studies, our findings do not show causality, but they support other work suggesting the importance of adverse childhood experiences on adult behavior and that the prevention of childhood abuse is of public health importance. Further studies are needed to examine how early age at onset of drinking and adverse childhood events relate to alcohol misuse in new female military members. Studies in Navy recruits suggest that a high percentage of female recruits had been raped and that many had experienced childhood physical or sexual abuse at much higher frequency than noted in male Marine recruits with the RAP questionnaire.[41,42]

Although the RAP was implemented at MCRD San Diego as a pilot study, the Department of Defense is taking steps to implement routine collection of computerized baseline health data from each person entering the armed forces. Recruit assessment health data will not be used to screen out candidates for the armed forces, but collection of accurate baseline health data is essential to evaluate health risks and behaviors before entrance into military service, to understand the potential effects of deployments and other exposures of military concern throughout the service member's military career and thereafter, and to develop and assess intervention and prevention programs for force health protection.

Our RAP database represents vital baseline health information from many US Marines who have been, are, or will be deployed overseas. A separate study, the United States Marine Corps Health Assessment Project, is presently resurveying Marines who are previous RAP participants to assess later health status in a large cohort of Marines several years after boot camp, with additional questions about deployment and exposure information; and to determine whether baseline health data were associated with subsequent postdeployment mental and physical health problems identifiable from surveys and inpatient or outpatient encounters. Future plans include studies to follow health and career outcomes of Marines identified from RAP as risky drinkers. Future studies may determine whether adverse childhood experiences help build resiliency and coping skills so that Marines subsequently involved in combat are less susceptible to developing mental health problems or whether they contribute to increased susceptibility to problems such as posttraumatic stress disorder and problems related to alcohol misuse. These kinds of studies enhance efforts for intervention and prevention programs to protect health and readiness, add to research in chronic multisymptom illnesses and mental health challenges, and should be considered important to the health of military personnel in future deployments.

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14. ABSTRACT (maximum 200 words)

Context: Problematic drinking behavior is a serious public health problem affecting every community, including the US military.

Objective: To examine the association between current problematic underage drinking behavior with factors including adverse childhood experiences and drinking onset age.

Design: A retrospective cohort study of recruits at onset of Marine Corps training, from June 2002 to April 2005, using questionnaire data collected with the Recruit Assessment Program, which includes demographics, clinical and medical history, family history, psychosocial history, and substance abuse screens.

Setting: Marine Corps Recruit Depot, San Diego, Calif.

Participants: 26 101 men aged 18 to 20 years (8013 identified as current problem drinkers, 7238 current non-problem drinkers, and 10 850 nondrinkers).

Main Outcome Measures: Current problem drinkers identified by scoring system based on 10 questions.

Results: Among drinkers, early initiation of alcohol use was a powerful predictor of current problem drinking, with a nearly 3-fold risk if use of alcohol began at age 15 or younger. Other significant independent predictors included history of smoking, older age, small or rural hometown, education beyond high school, motivation to join the military for travel and adventure or to leave problems at home, growing up with a problem drinker or someone mentally ill, childhood emotional abuse, and having numerous close friends or relatives for support. A history of rape was significantly predictive, but not childhood physical or sexual abuse. When the comparison group included nondrinkers, additionally predictive factors included a history of witnessing domestic violence, experiencing parental divorce at a young age, and childhood physical abuse. Factors protective against problem drinking included being married, attending religious services weekly or more often, and reporting parental education as not completing high school.

Conclusions: Public health efforts to decrease future problematic drinking behavior may be effectively targeted through prevention of underage alcohol use, tobacco use, and childhood abuse.

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